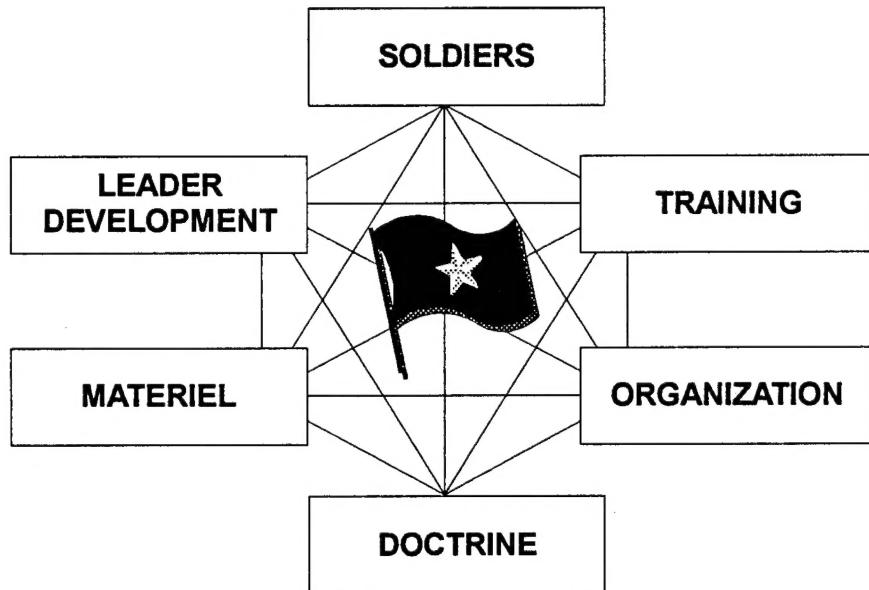


An Analyst's Observations

The MSF Commander:

Knowledge-based

Force Command Requirements



**FY 95 Mobile Strike Force
Battle Command Experiment**



Michael C. Ingram
TRADOC Analysis Center
Fort Leavenworth, KS 66027-2345
June 1995

19960401 128

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Introduction

The Mobile Strike Force (MSF) is a notional division-equivalent force used by the Training and Doctrine Command (TRADOC) for experimentation associated with Force XXI issues. These issues encompass all the realms of doctrine, training, leader development, organization, materiel, and soldiers (DTLOMS). The Battle Command Advanced Warfighting Experiment (BC AWE) 1994 used the 28 students of the 1993-94 Command and General Staff Officer Course (CGSOC) Battle Command Elective (BCE) as the core of the command and staff of the MSF. This command and staff employed the MSF in a series of simulation-driven exercises culminating with the CGSOC exercise Prairie Warrior 94. Subsequent to the BC AWE 94, the leadership of the Army decided to appoint an active duty General Officer as the Commander of the MSF during experimentation in 1995. The BCE was enlarged to include a total of 73 students in 1995 and again formed the command and staff of the MSF, but under newly promoted Brigadier General Geoffrey Miller, previously the Chief of Staff of the 2nd Infantry Division in the Republic of Korea. As an integral part of experimentation the Digitized Battle Staff (DBS) concept, a Battle Command Battle Laboratory (BCBL) initiative to reduce staff sizes, and to exploit digitization and information technology, was used to develop the command and staff structure for the MSF.

Having analytically supported the BCBL during the 1994 AWE, the TRADOC Analysis Center (TRAC) was requested to support the BCBL in 1995 as well. The appointment of an active duty general to command the MSF during experimentation was a significant difference between the experiments in 1994 and 1995. The TRAC study team believed that it would be conducive to the support of overall study objectives to directly observe the MSF Commander's actions throughout the experiment. Observing General Miller would allow an analyst to observe both his interactions with the MSF command and staff, and the effects of the knowledge-based environment on him. Further, the MSF Commander's influence on the MSF, DBS, and information operations (IO) concepts could be gleaned from this perspective. Finally, placing an analyst in this position would allow for more reliable and timely understanding on the study team of the actions of the MSF during the SIMEXes. The purpose of this paper is to document the salient findings related to battle command from this observation of the MSF Commander and to support the TRAC summary report on the 1995 Mobile Strike Force Battle Command Experiment (MSF/BC 95).

Methodology

The study team observed the MSF Commander throughout the course of the BCE. This included observation of three BCE simulation exercises (SIMEXes) and the culminating CGSOC exercise, Prairie Warrior; "one on one" command and staff introductory meetings between BG Miller and the BCE students; "brown bag lunch" tactics, techniques, and procedures (TTP) sessions conducted by the BCE students with guidance from CGSOC BCE instructors and BG Miller; various planning meetings with the MSF staff; and mentor meetings with CGSOC instructors. One analyst from the TRAC analytic support team was committed to observe the Commander throughout these activities, to conduct interviews with him, and to establish a

relationship with him such that an ongoing discussion could be conducted through these events to address the study issues.

Thus, the data collection tools used to gather information to address the issues discussed above were observation and interviews. The information gathered was then collated by the DTLOMS categories to identify and focus the salient points which resulted from the entire experience of the BCE experimentation. Within the DTLOMS categories, doctrine and materiel are further sub-categorized. A battle command summary concludes this report. This summary synthesizes all the information collated by DTLOMS to describe how the MSF Commander used the three concepts, MSF, DBS, and IO, as developed through the BCE, to accomplish various assigned missions.

- ◆ **Information Gathering**
 - ◆ *Observation*
 - ◆ *Interviews*
- ◆ **Collation by DTLOMS**
- ◆ **Battle Summary Synthesis**

Findings

The findings, discussed below, have been collated and are reported by DTLOMS category. Findings often have association with more than one category. In those cases the finding is reported in that category to which it has the strongest linkage. Assertions as to the importance of concepts, events, systems, or the like, are based upon direct observation of multiple events during the SIMEXEes and other activities previously mentioned, discussions with the MSF subordinate commanders and staff, and discussions with the MSF Commander. The set of personal notes made during the experiment (and delivered periodically to BG Miller) and oral and written reports to the remainder of the study team form the evidentiary basis for the reported findings, conclusions, and recommendations presented in this paper.

Doctrinal Findings

The MSF Commander further developed the MSF concept by establishing four interlocking pillars to support all MSF operations. These *doctrinal pillars* are maneuver (both ground and air), precision reconnaissance, fires, and maneuver logistics. Significant findings for each will be discussed in detail in subsequent paragraphs.

An interlocking component of doctrine evolved through the course of the experiment. This component is the information operations concept, as it was specifically developed by the MSF Commander. By approaching the development of the concept in this manner, all relevant evolutionary aspects of the MSF could be established and subsequently advocated.

- ◆ **Information Operations - Interlocks Doctrinal Pillars** ◆
- ◆ *Maneuver (Ground & Air)*
- ◆ *Fires*
- ◆ *Precision Reconnaissance*
- ◆ *Maneuver Logistics*

Information Operations

IO evolved through the course of the experiment to be a bridge or linking concept between the MSF and DBS concepts. Furthermore, it became an interlocking component for the MSF Commander among the four doctrinal pillars. *IO*, as applied in the MSF by the MSF Commander, will be described below and in subsequent sections of the paper.

IO is information warfare applied at the operational and tactical levels. For MSF operations, *IO* was primarily the execution of command and control warfare (C2W). C2W rests upon and integrates the pillars of physical destruction, intelligence, electronic warfare (EW), deception, psychological operations (PSYOP), and both operations and information security (OPSEC and INFOSEC). The integration of these pillars to achieve maximum exploitation of information is based upon situational awareness. Through complete understanding of location, status, and intent of both the enemy and friendly forces, the force commander can maximize mission success while minimizing risks. Because *IO* is a concept and not doctrine taught in the course of CGSOC, the MSF Commander slowly developed *IO* application in the MSF over the duration of the BCE. The MSF Commander began integration of *IO* into MSF operations by building a base of situational awareness enabled by development of the force level data base. This force level data base, the common picture, was the key to all MSF operations.

Information Operations Pillars

- ♦ Physical Destruction
- ♦ Intelligence
- ♦ EW
- ♦ Deception
- ♦ PSYOP
- ♦ OPSEC
- ♦ INFOSEC

Supported By
Situational Awareness - Based on Relevant Common Picture

The *common picture* of the battlefield is the aggregate of data that is shared among all friendly forces on the disposition of friendly and enemy forces. This force level data base is envisioned as system independent. This data base could consist of many data bases or segments. However, the division manages and ensures commonality and consistency of shared data. These data are used to build a tailored relevant graphic display or text report for the warfighter (at various echelons and functional areas) that increases in detail shown as the echelon portrayed is closer to the soldier. With a common picture of the battlefield, commanders and staff in the force will all have access to the same information at the same time. This does not imply that all division units have immediate access to all data collected anywhere throughout the force.

The *relevant common picture* (RCP) is a comprehensive view of the commander's battlespace, consisting of a graphical portrayal of enemy and friendly situation, commander selected statuses, and horizontal integration of the battlefield information systems. The emphasis is on selected, in that the RCP is a slice of all that is available to the force. The relevancy is

related to and dictated by the situation and mission. The RCP is that slice of the aggregate common, consistent force level data base which is used by various echelons and functional areas. The elements of information to build the MSF common picture were supplied by various sources - commander's staff, and subordinate, higher, adjacent, and other unit command and staff. The analytic mission of the staff is tailored to developing the RCP for the division commander, although there may be differing RCP requirements through the force, depending on the echelon and functional area.

The MSF explicitly used *commander's critical information requirements (CCIR)* to drive the development of both the common picture and RCP. CCIR consist of the sum of priority intelligence requirements (PIR), essential elements of friendly information (EEFI), and friendly force information requirements (FFIR). PIR are what the commander needs to know about the enemy. PIR tie together the collection plan, event template, the division target and supporting targets, and threat situational development. EEFI are what the commander does not want the enemy to know about the MSF. The EEFI form the basis for operations security planning. FFIR are what the commander needs to know about the MSF. This information provides the basis for friendly decision making based on the operational status of key units or equipment. CCIR were detailed in MSF operations orders and updated as necessary during operations. PIR were the category in which requirements were most often changed.

Because of the conceptual status of IO, TRAC hypothesized at the beginning of the BCE that the MSF would not be able to fully exploit the potential of the IO concept. However, because the MSF Commander gave great attention and weight to the development of the concept as a basis for operations of the MSF, information operations as applied in the MSF, did mature significantly during the BCE. As discussed above, the degree to which situational awareness was achieved indicates the maturation of the concept in a unit in which it was introduced during the experiment. The MSF Commander slowly and methodically trained the command and staff to develop one IO pillar at a time, and then to integrate them in turn. The pillars were all supported by situational awareness, which the MSF Commander spent the duration of the experiment developing. The MSF Commander was observed accomplishing this process throughout the experiment. Discussions with him periodically throughout the experiment confirmed that his actions regarding IO were as perceived. Notable among other components of the concept which were used to advantage by the MSF were deception operations, and electronic warfare, as integrated with fires or aviation.

Maneuver

The development of MSF doctrine by the MSF Commander during the experimentation related significantly to *battlespace*. Battlespace is the area in 5 dimensions - width, depth, height, time and electromagnetic spectrum - that the commander is assigned to dominate to achieve positional advantage and overwhelming combat power to bring the enemy to decisive combat. MSF battlespace extended approximately 200 kilometers deep by 150 kilometers wide. The MSF battlespace also included control of airspace over these dimensions from 0 to 30,000 feet above ground level. In Prairie Warrior the high density air control zone was raised to 100,000 feet above ground level. This extension of battlespace, through which the MSF fights as a whole

usually in nonlinear deployments, is at the heart of the MSF concept. This concept of extended battlespace, dictating many control and coordination measures different from current doctrine, is a reflection of the extended ranges of the weapons and sensors organic to the MSF.

Domination of this extended battlespace was critical to the success of the MSF and a primary concern of the MSF Commander. To dominate battlespace the MSF Commander indoctrinated the command and staff in the idea of denying unimpeded maneuver and fires to the enemy force. The MSF did not, nor could it, occupy all areas of MSF battlespace to dominate its area. Thus the Commander linked the idea of denying unimpeded maneuver to a method of identifying areas in the MSF battlespace by degree of interest, importance, or involvement by friendly forces. Midway through the BCE something akin to a system the MSF Commander referred to as the "gridded thrust template method of terrain management" evolved, which allowed the designation of grid boxes or nonlinear areas by hot, cool, or cold. Later a system to manage airspace placed a ten by ten kilometer grid system over the battlespace to identify routes and switch on or off as hot or cold. To dominate battlespace a hot area was defined as an area of battlespace that required the focus of assets - intelligence, combat, and logistic - to achieve the commander's intent. Hot areas were those in which there were significant friendly forces physically present, such as a convoy of class III/V assets on a main supply route (MSR), or into which significant friendly assets such as sensors or fires were directed. Prior to arrival in a particular box covering the MSR that box might change from cold to cool, and go hot during the convoy movement through the box. Cool was defined as an area of battlespace requiring some friendly collection focus to set the conditions for MSF mission success and limited fire or maneuver support to dominate. Cold areas were defined as areas where light or no friendly activity was expected and where enemy activity would not influence the MSF.

Domination of Extended Battlespace -Critical to MSF Success

The nonlinear extended battlespace and the concept of domination had various effects on MSF tactics. One effect was a need to designate "functional and spatial battle captains". The concept of designating sanctuary areas versus rear battlespace, and a "rear battle captain" who had responsibility to secure the sanctuaries and fight the rear battle was somewhat problematic. The sanctuary was defined as the MSF battlespace occupied by the division base that sustains operations. This area would be planned to locate out of enemy indirect fire range and was organized to coordinate all support to the MSF from echelons above division assets. This assignment of the rear battle captain was problematic because the MSF Commander asked a logistician to become a combined arms tactician with a significant task force for rear battle. However, to effect MSF doctrine in the future, logisticians will have to be trained to perform this function. As a survey of the BCE indicated, these officers who were proven to be representative of the entire CGSOC population were not multifunctional in terms of competency across branches or battlefield operating systems.

The extension of MSF battlespace has significant joint roles and missions implications. Extending the battlespace had the effect of turning current doctrinal close air support (CAS) into a conceptual combat air support. Air support allocations were under the purview of the MSF

through this battlespace. Combat air support would be controlled in some portions of the battlespace differently. The exploitation of preplanned and immediate air support allocations throughout the extended battlespace was examined, but the targets engaged with these missions were not necessarily close to friendly ground forces other than dispersed designator scouts, nor was there the type of positive control used currently when engaging targets close to friendly ground forces. Air interdiction (AI) missions which continued to require nominations, were flown exclusively outside the MSF battlespace, and hence, were often flown at significantly greater distances.

In addition to the battlespace implications described above, the MSF Commander relied on a series of planning and execution principles to develop the MSF concept. The first was a heavy reliance in the MSF on the *asymmetric packaging* of capabilities in task forces. The MSF was a highly tailorabile organization which the Commander exploited for specific missions. This tailoring usually resulted in heavy and light task forces formed to achieve an advantage against specific opposing forces. Asymmetric packaging of MSF forces also facilitated the tailoring of a significant sanctuary protection force which was allocated to the rear battle captain.

Planning & Execution Principles

- ◆ *Asymmetric Packaging*
- ◆ *Layering*
- ◆ *Signature Events & Triggers*

A second planning and execution principle was that of layering. *Layering* is defined as the packaging and use of multiple and redundant systems to ensure complete coverage and effects in the battlespace. The layering of both organic MSF and echelons above division intelligence assets to support division operations is an example of layering. The MSF Commander ensured that all commanders and staff clearly understood that no aspect of any plan could depend on the success of any single system. Layering mitigated such risk. Mutually supportive of the concept of layering was the idea of nesting. Nesting was critical to plans, just as layering was critical to capabilities. Nesting was defined as ensuring the commander's intent and concept of operations were synchronized throughout the MSF major subordinate commands (MSCs) and that the MSF plan was in turn synchronized with the higher headquarters' plan. Support of future operations, both the MSF's and higher headquarters' was ensured by the explicit attention the MSF Commander gave to nesting of plans.

A third planning and execution principle was that of battle management by *signature events and triggers*. Signature events were defined as friendly or enemy actions which cause a key change in the mission status of the MSF. Triggers were pre-defined sets of conditions the Commander had approved to initiate a phase or other event of the operation. These conditions established both enemy and friendly statuses for the event (e.g. 80 percent destruction of air defense artillery in zone and 90 percent of attack aviation battalion helicopters operational to launch an aviation deep attack). Almost all of the MSF Commander's practice of the art of command during execution of operations revolved around the read of signature events and the

synchronization of the command and staff on triggers. The entire MSF command and staff, therefore, had to be cognizant of them and perceptive to read them. The Commander used the technique of huddling to gain synchronization on such reads of the battle. The huddle could be a tactical operation center (TOC) huddle with only command assistance team, and plans and operations team members meeting face to face in the TOC. The huddle could also be facilitated by information technology and include other commanders and staff in a virtual collocation by audio or videoteleconference. Even in the knowledge-based MSF environment there was a clear requirement for leaders to collaborate in some manner throughout planning and execution. The response to this requirement was demonstrated throughout the experimentation, and on several occasions when there were synchronization problems among staff elements it was revealed that there had not been collaboration for clarification.

Precision Reconnaissance

The MSF Commander employed the division with a *force orientation*, rather than a *terrain orientation*. Once assigned an operational mission, the MSF had the assets with which to mitigate most adverse terrain effects it faced, and to negate terrain advantages which an enemy force might enjoy against a conventional force. During the SIMEXes and Prairie Warrior the MSF fought against an enemy strategic-level operational exploitation force (OEF) across extended battlespace and time. Defeat of the OEF focused all MSF planning and execution.

The MSF Commander exerted great effort to focus the division command and staff on the *division target*. The division target during these exercises was the 12th Mechanized Corps of the Orangeland Army. The MSF Commander further defined the precise target for destruction as the tanks and infantry fighting vehicles of the six mechanized brigades and tank brigade, and the long range artillery systems of the corps artillery group (CAG) and corps rocket artillery group (CRAG) of the 12th Corps. While there were, of course, other targeted systems within the corps such as air defense systems, reconnaissance assets, and the command and control structure, these would be attacked to set conditions throughout the battle or complete the destruction of the corps - the defeat mechanism was the destruction of the precise division target. The critical focus for the intelligence processing activities of the MSF was the division target and its velocity of closure with the MSF. Of course, to identify the MSF target and its rate of movement, signature units such as anti-tank and reconnaissance battalions were the initial focus of PIRs and the collection plan.

MSF Focused on the Division Target

The MSF used the *decide, detect, track, deliver, and assess (D²TDA) methodology* to execute the pillar of precision reconnaissance. This methodology linked directly to the concept of the division target. The MSF Commander explicitly drove the intelligence effort. The Commander identified the division target in the decide phase. Then PIR were developed to drive a collection plan which would enable detection and tracking both into and throughout the MSF battlespace. To manage D²TDA, the MSF Commander and intelligence staff built a graphic collection plan, which worked on the basis of hot, cool and cold areas. This graphic, disseminated

throughout the MSF, provided all command and staff timely awareness of collection support to their respective echelons and functions. The focus of collection efforts could then be changed, if necessary, in a more timely manner without adverse disruption of collection planning.

Decide, Detect, Track, Deliver & Assess

♦ ***D²TDA*** ♦

The concept of precision reconnaissance depends on *sensors* which provide real-time and near-real-time data to the intelligence staff for analysis and to attack means for destruction with precision attack systems. The "one target/one bullet" concept depends on the explicit linkage of precision reconnaissance and precision attack. Successful exploitation of this concept is mutually supportive of the pillar of maneuver logistics, which seeks to minimize the requirement to stockpile logistics. The MSF Commander emphasized two assets in particular to accomplish this linkage, designator scouts and unmanned aerial vehicles (UAVs). UAVs were a key to MSF tactics, as they provided "eyes-on" target confirmation with high reliability and timeliness, and low risk. These systems provided various sensors on board for flexibility, but did require a focused asset and tasking management effort to optimize spatially and temporally. Largely because of the way the system is deployed and operated, the UAV proved to be less able to meet any rapidly changing collection requirements which were geographically dispersed than the division reconnaissance squadron. Thus, the MSF Commander designated and relied upon the division reconnaissance squadron as the asset to respond to quickly changing collection requirements, as opposed to the UAVs.

Battle damage assessment (BDA) was paramount to the success of the MSF concept. This is because of the linkage between precision targeting, precision attack, and maneuver logistics. Sensor capabilities and weapons effects must meet systems requirements so that plans can be formulated with fidelity with narrow ranges of assumptions, and so predictive logistics can push forward precise, minimal replacements to sustain the force. To ensure that the expected linkage between sensors and shooters and the engaged target had occurred, the MSF emphasized BDA. Further, it was necessary to determine when and if conditions had been set across the MSF battlespace to sequence to subsequent phases of operations.

Counter-reconnaissance throughout the MSF battlespace became a predominant principle for MSF operations. Counter-reconnaissance integrated all intelligence assets, fires, and maneuver assets to negate one of the principal components of the enemy force, consisting of reconnaissance units of the 12th OEF and other remnant forces, and a proliferation of special purpose forces. Because of the small size and limited signature of these units, they were the greatest challenge to detect, track, and strike.

Fires

The fires pillar is significantly linked to precision reconnaissance in this concept. The fires pillar is what the MSF Commander uses to conduct effective precision strikes, and to reduce the maneuver logistics requirements. Battlefield shaping evolved as the integration of intelligence and

terrain to set the tempo and to sequence combat power into an engagement area by the use of active (dynamic minefields, spectrum dominance, jamming, etc.) and passive (intelligence sensors and collectors) means to set the conditions for decisive combat operations. The fires pillar is strongly connected with battlefield shaping, being the delivery means for mines and the major component of combat power delivered throughout the battlespace.

Flexible *engagement areas (EAs)* were the primary control mechanisms to leverage fires against the 12th OEF. EAs are areas in which the commander intends to trap and destroy an enemy force with the massed fires of all available weapon systems. The EAs used by the MSF were flexible in that they were able to be re-drawn as required to engage desired targets throughout the battle. The command and staff relied upon the EAs being quickly re-shaped to support the MSF mission as enemy intentions and movements became clearer. Because of the extended range of the MSF's weapons systems, flexibility of EAs was contributory to MSF success. The flexibility of the EAs directly supported the force orientation of the MSF. The MSF Commander sought to set conditions for decisive engagement in designated EAs by battlefield shaping to ensure a flow of the division target into EAs. EAs were used as a tool to concentrate fires and to optimize their effects. Timing to ensure engagement of the desired force in the desired area was a critical aspect to success of the MSF concept. Sensor-to-shooter time reduction was linked to this aspect to optimize the effects of sensors and fires. Again, the flexibility of the EAs further supported the force orientation of the MSF.

Flexible EAs - Support MSF's Force Orientation

The MSF Commander used clear articulation of intent to drive the MSF targeting effort. *Target prioritization* by the Commander clearly identified the focus for fires both spatially and temporally throughout the battlespace. Based on command guidance, the MSF targeting team's target priorities were a narrow set of enemy assets - 240 millimeter multiple rocket launchers, radar guided air defense artillery systems, 170 millimeter artillery, and the tanks and infantry fighting vehicles of the 12th Corps. This reflected the focus of the MSF Commander on what he described as the division target. Beyond these priorities for targeting, those enemy special purpose forces (SPF) engaged in reconnaissance and targeting of the MSF, especially in the MSF's sanctuary, and the enemy's command, control, and communications assets and nodes were consistently next in priority.

The MSF Commander recognized and emphasized the particular problem of fires integration throughout the extended MSF battlespace. Integration of fires included management and conflict resolution of division and MSC counterfire and counterbattery plans, problematic because of the extended weapons ranges, rates of fire, and mobility characterizing the MSF. Integration also involved coordination of simultaneous Air Force fixed wing, army aviation attack, and army tactical missile system (ATACMS) strikes throughout the MSF battlespace. This type of simultaneous effort required extremely close coordination to ensure maximum lethal suppression of enemy air defense (SEAD) effects prior to strikes and optimal numbers of accompanying electronic combat (jamming) aircraft to conduct SEAD during strikes. Electronic warfare for SEAD, to cover the signature that the MSF was transitioning to decisive combat, or

to preclude the enemy from exercising effective command and control were all examples of the active conduct of IO which the Commander integrated into overall operations.

Maneuver Logistics

The development of the pillar of maneuver logistics was predicated upon the linkage of precision reconnaissance and precision fires working to achieve the optimal outcome of the one target/one bullet concept. By precisely destroying the MSF target to defeat the enemy, the logistics burden of the MSF could be minimized. However, even with one target/one bullet effects, the geographic range and number of targets to be attacked by the MSF result in a significant logistics requirement.

The sustainment of continuous operations over a limited period of time, but over an extended geographic range is another key to the MSF concept. The MSF Commander desired for the DISCOM Commander, the *logistics battle captain*, to manage support of the high tempo of operations in this robust force by linking, through accurate *predictive logistics*, an efficiently sized logistics stockpile with the maneuver and fires assets of the MSF just in time during operations. Because of the force's sustained tempo, supply classes III and V are key to the success of the MSF, as is a proactive management of class VII. Thus, predictive logistics, the accurate and timely forecasting of logistics requirements, was emphasized to ensure this success. Much of the predictive logistics problem was mitigated by the forward positioning of major end items. To meet the remaining sustainment requirements, the logistics planning staff determined that MSR maintenance and security was critical to the maneuver logistics pillar of MSF doctrine. Open MSRs were shown to be necessary to move forward sustaining supply items to adequately support the MSF. In part, this was because the MSF is a force which is projected forward in separate parts, and not necessarily spatially contiguous. To mitigate the risks associated with using constrained MSRs in especially compartmentalized terrain, the MSF Commander had the logistics battle captain evaluate the use of caches versus off-the-truck logistics support. Caches would be restricted and limited in a force like the MSF, rapidly moving and dispersed, but the off-the-truck concept depends upon freedom of movement on MSRs. In an effort to mitigate the problems with either approach, the MSF Commander emphasized the movement into and use of prepared areas for logistics bases. This use of previously occupied, prepared positions helped to minimize requirements on the limited engineer assets of the MSF. This is a good example of how the MSF Commander explicitly linked assets of the MSF whenever possible to mutually support missions and optimize the effects of the force.

Training Findings

The MSF Commander tied training and leader development closely together. He attempted to set the conditions for success of the MSF and the BCE early. *"One on one"* sessions were held with each staff group and MSC of the MSF. During these sessions the Commander explained his early vision for the MSF, his idea of how the DBS concept would work, and how he believed the BCE would evolve. Subsequently the Commander took available opportunities during systems training, planning, and execution to perform mentoring of individuals and small groups.

"*Brown bag lunch*" sessions were used as a vehicle for TTP development. The Commander had small groups representing functional areas develop initial concepts for TTP in selected areas of concern, such as precision reconnaissance, counter-reconnaissance, and maneuver logistics. These groups presented the concept TTP to the entire MSF for review and subsequently refined it based on this review and the commander's input. This MSF development and review technique ensured timely, thorough development of MSF TTP and a tactical SOP.

The MSF Commander recognized quickly during the BCE the problem of introducing the MSF and DBS concepts and the *Phoenix* battle command support system simultaneously. There was an inherent difficulty associated with using unfamiliar 2010 concept weapons and sensors, but this could have been mitigated by using familiar automated or manual systems and familiar C2 procedures. The BCE had to learn current systems and procedures in CGSOC, and subsequently learn and apply these various new concepts. The original experimental design for the AWE ensured that only one variable at a time would be changed in the context of experimentation; however, the DBS concept was added after the approval of the experiment design and without regard to experimental impacts. This became problematic not only for data collection and analysis, but more significantly as a major training obstacle.

Leader Development Findings

As stated previously, the MSF Commander tied training and leader development closely together. The leader development process started immediately in the BCE with the *staff selection process*. The Commander made the final determination as to what jobs the 73 students would perform based on the following criteria. Each student was asked to indicate their preferred position. The CGSOC instructors made an initial fill of the positions largely based on these preferences. Then the Commander evaluated officer record briefs of each student. He also spoke telephonically with approximately thirty former supervisors. Subsequently the Commander examined the Myers-Briggs personality test results for each student, paying particular attention to outliers. The Commander also evaluated students during some CGSOC classes. Finally, based on the mix of experience, personality, and perceived potential, the Commander assigned the BCE students to MSF command and staff positions.

Leader development began with "*one on one*" sessions with each staff group and MSC immediately after the course began and assignments were made. As was stated above, the Commander explained his early vision for the MSF, his idea of how the DBS concept would work, and how he believed the BCE would evolve. He also began active coaching and mentoring during these sessions. The "*one on one*" sessions were the genesis of the active, strong communications which prevailed within the MSF.

The MSF Commander also used the "*brown bag lunch*" sessions as a vehicle for leader development. He actively worked with each week's presentation group to refine the TTP, and to continue the mentoring process. Furthermore, he used opportunities during training, planning, and execution phases of the BCE to mentor individuals and small groups.

Another important component of leader development was the *key leader meeting*. The Commander conducted a key leader meeting after every day's events during each of the three SIMEXes. These meetings were very important to the MSF's success during the SIMEXes, because the MSF Commander worked to ensure command and staff synchronization regarding planning and execution, and clarity of commander's intent during these meetings. The key leaders meeting was further evidence that face to face collaboration among leaders will continue to be important even in a highly automated, digitized environment.

The MSF Commander exercised a style of leadership that can be described as *leadership by wandering around*. The management theory of management by wandering around does not capture the leadership embodied in the constant movement into and through the MSF staff cells and MSCs. The Commander went beyond managing division resources and exerted strong, positive leadership while "wandering around". The Commander went to the engaged brigade TOCs to boost morale and gain information. He reported developing the best sense for the battle at the most forward headquarters once the division was engaged in decisive combat. During exercise Prairie Warrior the heavy brigade TOC was observed to be the source of the most timely, reliable, and credible information in the division during the decisive close engagement. This was because the reporting of the maneuver battalions and their companies to the TOC constituted the majority of current intelligence in the Brigade, once its subordinate units were engaged in close combat.

Leader Development Enablers

- ♦ ***Focused staff selection process***
- ♦ ***One on one command and staff sessions***
- ♦ ***"Brown Bag" TTP development***
- ♦ ***Key Leader Meetings***
- ♦ ***Leadership By Wandering Around***

The Commander emphasized risk taking throughout planning and execution. However, he also emphasized that no risks were to be taken without careful consideration of available options and active risk mitigation. Leaders must be well trained and highly motivated to plan and execute in a risk taking environment. They must be absolutely clear on the mission and the commander's intent, and must be able to act on mission-type orders. They must be able to do this to ensure the capabilities of the MSF can enable the commander to maintain the initiative against an active, thinking enemy force.

The MSF Commander actively sought to develop a close relationship with the MSF deputy commander. The Commander's objective was to establish conditions in which he and the deputy thought alike regarding major considerations in planning and execution. However, in part because there was limited time and opportunity to establish the kind of relationship which could probably be achieved in a unit environment, this fusion was not accomplished. As an example, although the MSF Commander explicitly gave the deputy great latitude to further develop the role of the deputy commander which was outlined in the DBS concept, the deputy became frustrated midway through the SIMEXes regarding the limitations of his role as he understood it. The

observation of the development of the commander-deputy relationship is important because it indicates that in an environment of new concepts and new systems there will continue to be leader development requirements which are strictly human oriented.

Organizational Findings

The MSF Commander wove IO throughout organizational aspects of the MSF during the BCE. Early in the BCE the Commander directed the deputy commander to establish an IO point of contact in every cell. Initially these officers raised issues with information management systems and procedures, and began development of division TTP to ensure situational awareness.

The MSF Commander influenced the development of the DBS concept in several significant aspects. He used the *command action team (CAT)* effectively as the BCE progressed. The Commander explicitly emphasized his connection to the CAT, and his physical presence in the CAT command and control vehicle (C2V). He assigned each of the three primary CAT officers responsibility to monitor functional areas and particular MSCs, which allowed them to develop relationships with the parallel personnel in those areas of responsibility. The Commander assigned his aide the responsibility to run the commander's workstation, which was the primary physical location of the division commander's RCP.

The MSF Commander used the CAT to look at the big picture from the division perspective. At the same time, however, he had the assets in the team to view other echelon and function RCPs. The Commander followed almost all deep battle and deep attack activity from this position. As the BCE progressed the Commander used a CAT member as a scribe during trips to MSCs. This was one designated member who not only took notes during the tours, but also acted as a liaison to other elements of the MSF and to higher headquarters.

The *plans and operations (P&O) teams* evolved greatly and in rapid fashion near the conclusion of the BCE. The executing P&O team always fought the current battle, but during Prairie Warrior the situation dictated that the planning and executing P&O teams be task organized. Several team members went into MSCs for tighter liaison and to effect more timely support, and the planning team was able to better support the current battle by timely development of branch plans.

Many times different perspectives were developed by command and staff elements accessing and using the division data base differently. During the entire BCE the MSF Commander used any varying perspectives of situations held by the executing P&O team and the CAT as decision input. By examining what two groups of officers were concluding from the same view of the common picture, the Commander was able to make more informed assessments of battlefield situations.

The *knowledge processing team (KPT)* functions evolved during the BCE. The MSF Commander primarily focused the KPT as the manager of the division common picture. To perform this function the KPT had to collect both enemy and friendly data and maintain

commonality and consistency of these data in the common picture. The integration of echelons and functions to accomplish this task was the most difficult of any aspect of the DBS concept.

The Commander made one major organizational impact outside of the DBS concept. This was in the area of *task organization*. Early in the BCE, the Commander explicitly stated that "nobody fights as a battalion." The MSF Commander emphasized forming asymmetric task organizations throughout the entire BCE. This emphasis left an indelible mark on the MSF command and staff, and there was never any planning or execution observed in which there was not conscious consideration to task organization possibilities. During the experiments the MSF task organized many different ways. In some cases further task organizing assets did not make sense and was not done. However, the MSF, as organized for the experiment, was demonstrated to be readily tailorable throughout the experiment.

Materiel Findings

The MSF Commander explored and subsequently advocated specific materiel items or systems in the development of the three major concepts (MSF, DBS, and IO). These were placed into one of three systems categories - C2, IO support, or MSF weapons.

Materiel Categories

- ♦ ***C2 System***
- ♦ ***IO Support Systems***
- ♦ ***MSF Weapons Systems***

C2 System

The MSF C2 system will be discussed in terms of those capabilities used by the MSF Commander during the experiment or desired by him for use in a Force XXI knowledge-based environment. Force XXI will exploit information to the fullest extent possible, and will maximize the use of electronics and digitization. However, Force XXI will also optimize the use of human interaction and support the human battle commander and staff with all efficient means of decision support, whether analog or digital in nature. This will be discussed below.

A set of C2 materiel requirements were derived. The requirements in this set were considered significant for various reasons as discussed below and are grouped by primary and secondary requirements. These requirements are based on observing the MSF Commander in the knowledge-based environment throughout the BCE. This set of requirements is not intended to be an exhaustive list of C2 system requirements, but either validates existing requirements or adds to them. This set has special meaning because of the derivation of them by observation of the MSF Commander in the knowledge-based environment.

Primary requirements. The most significant of all requirements are those which are collaborative technologies. The single most important requirement is the *large screen display*

(LSD). LSDs, in the form of high resolution 37 inch Mitsubishi monitors were added to the command and control vehicles (C2V) soon after the start of the BCE. They were further proliferated throughout MSC cells later. The need for a larger display for the Commander's workstation was evidenced within hours of the first SIMEX start. The monitors provided with the individual C2 workstations were simply too small for collaboration. Further, they did not permit anyone to visualize the division battlespace all at one time other than at a map scale at which all details were lost.

♦ ***Large Screen Display Essential For Collaboration***

The second most significant requirement was for *redundancy of C2 means*. This requirement usually manifested itself through the failure of some component of the C2 system. The experimentation with the DBS concept and the *Phoenix* system to support it revolved around a notion of operating in a "paperless TOC" environment. To this end there were no printers or print capabilities initially provided with the *Phoenix* and the MSF Commander strove to promote this environment. However, the idea of a "paperless TOC" misses the point of maximizing the use of electronics and digitization. There is a requirement for redundant backup manual C2 means in the event that electromagnetic pulse or other future electronic attack means render our digital systems ineffective. Furthermore, individuals demonstrated that studying text or graphics which were printed on paper continued to be a highly effective means to absorb and learn information. Additionally, groups of individuals demonstrated throughout the BCE, but especially during the Prairie Warrior exercise, that group collaboration around large paper maps of medium scale (1:100,000) is the preferred method of command and staff collaboration. The same type of collaboration occurred at the *Phoenix* workstations, but unless the screen were projected on to the LSD, the number of personnel who could see the information were limited. The size of the area portrayed on the LSD at the preferred map scales (1:100,000 and 1:50,000) was limited and was somewhat awkward when supporting operations throughout the extended MSF battlespace. This was problematic in the Aviation Brigade and Division Artillery headquarters.

♦ ***Ensure Redundancy of C2 Systems***
♦ ***No "Paperless TOCs"***

The third requirement is represented by another collaborative technology. The MSF, despite recurring failures of the system, exploited the *videoteleconferencing (VTC)* capability to great effect. Further, in the first SIMEX when the video portion of the VTC placed too great a load on the network in the BCBL to run VTC effectively, the MSF Commander decided that the MSF would exploit the collaboration capability through audioteleconferencing (ATC). Thus, standard procedure became that the elements of the MSF would collaborate in planning and execution via the ATC, with a capability termed the *white board*. The white board allowed a common picture to be brought up on the system, which all participants in the ATC could view, and with which they could interact. The white board had an interactive marking capability which allowed any individuals in the conference to mark on the common picture displayed. The

white board was the vehicle for most collaboration by the MSF command and staff during the third SIMEX exercise Prairie Warrior.

♦ *VTC and White Board Enhance Collaboration*

The requirement for an *automated wargaming support tool* was validated during the BCE. A capability of this type was forecast to be a component of the *Phoenix* system, but no capability to support this function in any manner ever materialized. During exercise Prairie Warrior, the CAT intelligence officer helped the Commander to "wargame" (visualize enemy courses of action) by moving enemy brigade symbols across an LSD, keeping them in place with tape.

♦ *Automated Wargaming Support Required*

The requirement for a highly mobile, protected command post vehicle such as the *C2V* was validated during the BCE. The Commander, as stated prior, demonstrated that in the knowledge-based environment the force commander will continue to lead close to the front of the force. Because of this and the dispersion of units in the MSF and the rate of speed at which they move, a *C2V* type of system is essential. There were several positive aspects to the configuration demonstrated. The provision of an LSD in the *C2V* was a positive addition, but the physical location where it was placed was awkward. Inserted in the side wall to the backs of the CAT workstations, it was difficult for more than one or two officers at a time to get a good view of it. As the Commander used the LSD more and more for collaboration with the command and staff in the *C2Vs* during the exercises and in so doing demonstrated the value of these integrated components, it is imperative that an optimal physical location for the LSD be determined. The communications headsets in the *C2Vs* were very effective. These headsets enabled all the members of the CAT and the Commander to be engaged in discussions simultaneously with external elements and not distract one another. The headsets also allowed the Commander to collaborate with external elements from his *C2V* position, while the CAT members engaged in discussions in the *C2V* among themselves and others. Finally, the *C2V* was able to accommodate as many as nine personnel at one time who were engaged in current operations of the division. The Commander's *C2V* comfortably accommodated six personnel most of the time during the BCE exercises.

Secondary requirements. There was a small set of secondary requirements derived during the BCE. Two requirements were cited in the TRAC report on the BC AWE 1994 and were revalidated. These requirements were for *dynamic display* and *range fans*. The command and staff elements of the MSF adapted facilities in *Phoenix* to indicate change in unit locations over time. The emphasis on the division target and tracking its velocity of closure into the EA led to extensive use of this capability. However, the capability was rudimentary (essentially situation templates at several different times overlaid for a static display) and required extensive human work. The capability to draw range fans, essentially circles of given radii, proved to be very effective during planning and execution. The division artillery made the most extensive use of this capability. The intelligence collection planners also made effective use of this tool.

The necessity to provide *float systems* in any fielding plan was evidenced through a system failure. One of the SPARC workstations in the CAT C2V had to be evacuated following a power surge. This event caused some redistribution of available workstations. This shortage of workstations was not a fault of the BCBL which had procured as many as possible for experimentation, but did demonstrate the necessity of float workstations to any total system.

Alarms were demonstrated to always be useful to system users and necessary once the flood of information began during operations. Alarms were one of the capabilities the MSF used to mitigate the adverse effects of information overload. This capability was most useful to the intelligence staff. Experience with the all source analysis system (ASAS) has previously proven that alarms are one tool necessary to assist staffs during the flow of large volumes of data.

The requirement for *graphic reports* was made very clear during the BCE. The MSF Commander influenced the staff elements to develop as many graphic reports as possible. These were another tool which alleviated information overload effects. Notable among this type of report were the graphic collection plan and the graphic intelligence summary. Each of them were characterized by three primary traits. Each presented large volumes of information on single graphic displays. They were division-oriented, but with significant amounts of information required by the MSCs to synchronize planning and execution. Finally, both provided a visual common picture and were the vehicle for numerous MSF collaborations. One, the intelligence update, became routinized over time. The graphic intelligence summary helped to eliminate some of what the MSF Commander termed the "blobology" resulting from the display of literally hundreds of small units in the area of operations.

The materiel system provided excellent support to command and staff development of several products. These are characterized by *grid overlay*. The MSF Commander required that the grid feature be enabled for display of maps. The division standard was the ten kilometer by ten kilometer grid. This enabled users of the displays, whether viewing monitors or LSDs, to gain immediate spatial perspective of the battlefield. Furthermore, the grid feature enabled the MSF to build two key products, *strike boxes* and the *A2C2 overlay*. Strike boxes were overlaid across the entire MSF battlespace and were coded to permit immediate reference. This enabled the command and staff elements to rapidly focus on all areas of the battlespace without relying on the knowledge of grid coordinate references, which was more cumbersome. It became standard practice that situation development revolved around strike boxes, and even target development, which required precise grid coordinates, began with reference to strike boxes. The A2C2 overlay combined grid overlays and the strike box reference concept to depict routes, and hot, cool, cold designation to coordinate and control the MSF airspace. These were very positive demonstrations of current Phoenix capabilities which present a clear view as to what any objective C2 system must provide.

An efficient, user-friendly electronic mail (e-mail) system is required to diffuse information throughout the command and staff elements. The e-mail component of *Phoenix* did not facilitate timely, reliable written collaboration among the MSF. The MSF Commander's attempts to diffuse information among the MSF by e-mail as a record subsequent to verbal communications was

stymied by the complexity of the e-mail component and the slowness of communications over the network at times. Furthermore, it was not possible to receive and access e-mail at a workstation while simultaneously using either the ATC or VTC capability.

IO Support Systems

The MSF Commander emphasized several systems which can be described as IO support systems. This category includes all the intelligence sensors and processors. However, the Commander placed special emphasis on the employment of several of them. The foremost of them were the two types of UAV. As previously discussed, the UAVs were a key tactical system for the MSF, providing "eyes-on" target confirmations. Their employment was particularly supportive of both situational awareness and physical destruction. The Commander also showed continued interest in the employment of both ground based common sensor and the remotely monitored battlefield sensor system (REMBASS), as these were used to support the rear battle captain. Because the MSF success was predicated upon fighting deep in the extended battlespace, and with great speed and high mobility, these systems were optimally used to focus on the counter-reconnaissance fight in the sanctuary.

Air Force electronic combat (EC) assets were particularly valued by the Commander. These assets supported the IO pillars of EW, physical destruction, and deception. The MSF coordinated employment of EC assets to support MSF assets directly and EC assets were components of Air Force strike packages to provide protection against air defense.

The extended range, Firefinder radar, AN/TPQ-37, was a highly valued asset in the MSF. The system's range supported the MSF throughout its battlespace. The system supported both physical destruction and situational awareness. Because the MSF had only four available (based on a basis of issue of two per division, two per field artillery brigade), the radars' security and positioning on the battlefield were critical considerations for the Commander during planning and execution. Transportable by CH-47, radar positioning throughout the battlespace is possible.

MSF Weapons Systems

The MSF Commander emphasized several of the current and 2010 weapons systems and munitions during the development of the MSF doctrine. One system most emphasized was the *FERRET*, a simple cruise missile which fits on the Hellfire station of army helicopters. The *FERRET* flies a preset course to target areas, locates targets precisely, and then confirms the target with the launch platform via datalink prior to engagement. Via the datalink, the system provides an additional sensor for situational awareness. During the SIMEXes, the *FERRET* was simulated with a range approximating the extent of the MSF battlespace and a precision kill capability. Thus, the *FERRET* was used as a *conditions setting* weapons system. This range was increased for the Prairie Warrior exercise, but the additional range was not leveraged because it extended beyond the MSF battlespace. In this conditions setting role the *FERRET* was used to destroy primarily enemy air defense assets.

Two munitions were used primarily for *battlefield shaping*. The *wide area munition (WAM)*, primarily as it was delivered by multiple launch rocket system (MLRS) or ATACMS was used to achieve separation of enemy forces, and to control the enemy's velocity of closure. These efforts focused upon the division target. The *brilliant antitank (BAT) munition* was also used for these purposes. BATs are submunitions of blocks II and IIA ATACMS that detect and destroy moving and moving/static armor target sets, respectively. The range of the block IIA ATACMS supported the MSF throughout most of its extended battlespace.

The MSF Commander relied heavily on two new systems to support his emphasis on *task organization*. The *armored gun system (AGS)* is a relatively light, air droppable, armored, assault gun. This system provided the Commander an asset with which to strengthen both the light brigade in its forward deployments and the sanctuary protection force in its rear battle. The second system which enabled this to a lesser extent was the *high mobility artillery rocket system (HIMARS)*. This is a wheeled MLRS with a single rocket pod. It is transportable by C-130, but would have had much greater impact in a task organization context if it were transportable by CH-47. The MSF Commander explicitly sought resolution of its actual transportability early in the BCE, when the CGSOC instructional staff believed the CH-47 might be capable of lifting the HIMARS. Regardless, the system provided further flexibility to the MSF, as it was readily task organized.

Finally, the MSF Commander was enamored with the use of two disparate weapons systems used to execute the *counter-reconnaissance* mission. These two weapons were the new *120 millimeter mortar* with precision munitions and the Air Force *AC-130 gunship*. Both of these systems were capable of providing precise, lethal fire to support the rear battle captain. These two systems enabled the MSF to link precision reconnaissance to precision fires throughout the battlespace. Each required tight coordination to use effectively and safely throughout the battlespace. This coordination was facilitated by the hot, cool, cold concept.

MSF Commander-Emphasized Weapons & Munitions

- ◆ *FERRET*
- ◆ *WAM*
- ◆ *BAT*
- ◆ *AGS*
- ◆ *HIMARS*
- ◆ *120 MM Mortar (& precision munition)*

Soldiers Findings

The findings related to the soldiers category seem obvious, but are significant. First is a finding that is also identified and discussed in leader development, but must be discussed from the soldier perspective. The presence of the commander at the front is critical to the soldier. Although the commander gains much valuable information and feel for the tempo of the battle from going to the point of the fight, what the commander brings to the point of battle is leadership

by example and encouragement to the individual soldier. This is important as the soldier will continue to be the most vital component of the U.S. Army in Force XXI. The need for the commander to exert strong, positive leadership on the battlefield will not change in the knowledge-based force.

Second, the success of a knowledge-based force will depend on highly trained, motivated personnel who understand the commander's intent and can act on mission-type orders as readily as the leadership. Although the BCE experience demonstrated the need for the MSF command and staff structure to be synchronized on all planning and execution, it implicitly evidenced the fact that all personnel affected by or who could ever affect the planning or execution of the MSF need to have clear understanding of the mission, the commander's intent, and the plan in force. Dispersion of the elements of the force and the proliferation of small teams throughout the MSF battlespace, whether designator scouts, class III/V convoy personnel, or otherwise, heightens and intensifies the requirement for much greater synchronization throughout the battlefield than historically. Knowing what the units to your right and left are doing is no longer adequate on the extended, nonlinear battlefield.

Third, advanced, complex technologies must be easy for the soldier to use. Systems must be usable by and useful for soldiers, and not require extraordinary aptitude, training, or perseverance to exploit. This is true of the advanced weapons and sensors which Force XXI will exploit to advantage on the battlefield and it is true of all the components of the command and control system. Usefulness of systems must be readily apparent to soldiers and for soldiers to use the systems to advantage they must be characterized by ease of use. Furthermore, although systems may be easy to use, they must also be efficient, requiring few steps for usual tasks and functions. The students in the BCE demonstrated that if an operation is both easy and simple it will be performed as required in all situations, whereas those operations which are difficult or complex or both will be disregarded in stressful or time constrained conditions.

- ♦ *The Battlefield Presence of the Commander is Critical*
- ♦ *Force XXI Will Require Highly Trained and Motivated Soldiers*
- ♦ *Force XXI Technologies Must Be Both Easy To Use and Useful*

Battle Command Summary

The MSF Commander developed a routinized approach to battle command of the MSF over the course of the BCE. This approach manifested itself in his interactions with the MSF command and staff during planning and execution of operations. The principal aspects of the approach are summarized below.

The MSF Commander always gave clear guidance to the MSF upon the receipt of mission orders from higher headquarters. Once he performed mission analysis, during which he usually interacted with the CAT, he integrated himself into the P&O team's planning cycle. Although he did not infringe upon their planning responsibilities, the Commander made himself available for multiple sessions to provide guidance and to clarify his intent, to wargame with the team, and to review the plan developed by the team in back briefs. During these periods he ensured that capabilities were layered, asymmetrical task organizations were examined, and triggers were determined. The Commander used a member of the CAT as a scribe during planning.

Once operations initiated, the Commander aligned himself with the CAT and occupied the CAT C2V. He monitored the early phases of all operations on the large screen display in this location. The Commander concentrated his attention during these periods on the entire division battlespace and beyond it into areas of interest to the division. He was the person in the MSF most focused on the division target while it was beyond the MSF battlespace. The Commander was also the person most concerned with battle handover issues with adjacent and higher headquarters.

During the early phases of operations the Commander routinely visited the MSC headquarters (in actuality these visits would be made by helicopter and the time this transit would take was considered during the BCE). During the visits to the MSCs the Commander ensured the MSC commander's clarity of MSF Commander's intent and understanding of the plan, and the MSC's capability to execute the plan as time passed. The Commander explicitly analyzed the situation to determine if division assets or influence was required to be committed.

As the division progressed into decisive combat, the MSF Commander began to virtually spiral his tour of the MSCs each day toward the decisively engaged unit. Whereas, in early phases of the operation he spent nearly equal time and effort with each MSC each tour, prior to decisive combat he spent disproportionately more time with both the main and supporting effort units. During exercise Prairie Warrior, when the division became decisively engaged, the MSF Commander spent a significant amount of time in the brigade TOC of the heavy brigade. Although the MSF Commander worked side by side with the brigade commander during decisive combat, he was able to refrain from micromanaging or fighting the brigade commander's battle. The MSF Commander did provide division influence and assets with immediate responsiveness. The Commander also spent more time in both the aviation and light brigade TOCs during the decisive phase of the operation. From these forward locations closer to the battle than the division tactical headquarters, the Commander was able to get the most timely, credible, and reliable information available at that time - that from the brigades' personnel in contact.

Conclusions

The designation of a dedicated, active duty General Officer to the command of the MSF resulted in immeasurable benefits for the Army. The MSF Commander learned first hand what this type of AWE is like. He was able to directly influence a significant group of future leaders of the Army. Furthermore, he will be able to directly influence the current Army Senior Leadership regarding Force XXI development, based on an intensive personal experience helping to develop the three supporting concepts of MSF, DBS, and IO.

The MSF Commander recognized and explicitly cited the difficulties associated with introducing multiple concepts and systems simultaneously in the AWE. Adherence of the AWE to sound experimental design principles which were advocated by the study team might have mitigated some of these difficulties.

Throughout the experiment the MSF Commander adhered to Army doctrine as articulated in FM 100-5. He adhered to the principles of war and operated in accordance with the tenets of Army operations. Furthermore, he integrated the dynamics of combat power as appropriate to the situation and integrated and coordinated combat functions to synchronize battle effects in time, space, and purpose. However, he incorporated the MSF and IO concepts within this context and helped to show much of their potential and relevancy for Force XXI. Furthermore, the MSF Commander's development of the MSF command and staff, and their subsequent operation within the organizational structure of the DBS concept revealed both the potential benefits and shortcomings of the concept.

The MSF Commander took no actions during the experiment that were contrary to the idea that it is the Soldier which is the foundation of the Army. The MSF Commander demonstrated in his interactions with the command and staff of the MSF that regardless of the concepts and systems which may characterize and comprise Force XXI, the human dimensions of soldiering, leadership, and battle command will continue to be important to the Army.

- ♦ **Designation of an Active Duty General Officer to Command the MSF Enhanced the Experiment**
- ♦ **Adherence to Good Experimental Design Principles in AWEs will Further Enhance these Events**
- ♦ **Continued Development of the MSF and IO Concepts as Force XXI Doctrine is Warranted**
- ♦ **Continued Re-engineering of Battle Command for Force XXI is Warranted**